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EXAMINER	
YEN, ERIC L	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/806,662	KIKUMOTO, TADAO	
	Examiner	Art Unit	
	ERIC YEN	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 January 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-52* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-50 and 52* is/are rejected.

7)☒ Claim(s) *51* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In response to the Final Office Action mailed 10/1/09, applicant has submitted an amendment and Request for Continued Examination filed 1/22/10.

Claims 1, 37, 38, have been amended. New Claims 51-52 have been added.

Response to Arguments

1. Applicant's arguments with respect to claims 1, 37, 38, and 52 have been considered but are moot in view of the new ground(s) of rejection.

As per Claims 1 and 37-38, it is not clear what applicant means by "relative to other frequencies of each of the frequency bands" because setting a modulation level at a particular value (e.g., 1) when there are different modulation values for other parts of the spectrum (e.g., 2, 3, anything that is not 1) invariably sets the value at some level that has a relative difference to other modulation values applied elsewhere. Therefore, if there is some significance to how one modulation value is calculated (i.e., by using the other modulation levels) then this must be more clearly claimed.

Choi and Cano teach interpolation between target parameters and analyzed input speech parameters, at least obviously interpolates different parts of a spectrum in different fashions because the different voices can share the same frequencies in some frequency bands (at least, e.g., if there is no frequency in the extremely high frequency bands in both voices) in which case there would be a different multiplier applied to the input speech than if there was a big difference in another region. This sets a

modulation level at one part of the voice frequency spectrum that is different from the modulation relative to the modulations at other frequencies, and therefore the "modulation level at" a given "center frequency" is "set" "relative to other frequencies of each of the frequency bands" since each frequency has a particular value when the entire input voice is interpolated with a target voice. The different modulation/interpolation levels are independent of the others and are, at least obviously, different ("relative to") depending on the difference between the target and input speech.

The language "relative to other frequencies of each of the frequency bands" does not require that the modulation levels be determined depending on values associated with the other frequency bands, and therefore Cano and Choi, who teach/suggest that different interpolation amounts happen to be different relative to each other also falls within the claim scope.

Therefore, new prior art rejections are presented based on the art previously provided.

Applicant argues that Gibson does not teach setting modulation levels at the fixed center frequency relative to other frequencies because, "the Gibson reference discloses changing values at other frequencies as well". However, reciting that the modulation level is set relative to other frequencies does not mean that the values at other frequencies are fixed and that only the center frequency is changed.

Applicant also points to the previous Office action asserting that amending the claims to recite "relative to other frequencies of each of the frequency bands".

However, the section on page 3 described that applicant does not claim only the center frequency's modulation level is changed, which as discussed above is not the scope of the amended claim language "relative to other frequencies". The section on page 6 of the Final Action also says tat applicant's claim language does not require that values associated with a particular center frequency is fixed (i.e., left unchanged). This is also not reflected in the claim language because this discusses leaving values unchanged at particular center frequencies and not setting (i.e. changing) modulation levels at a center frequency and nowhere else. Applicant was arguing that shifting a spectrum changes the center frequency which was not true. Regardless, this section does not say that setting modulation levels "relative to other frequencies of each of the frequency bands" is not taught in the references because, at least, it is not clear how this is synonymous with changing only the center frequencies of a spectrum.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1, 37-38, are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

"setting modulation levels at the fixed center frequency of each of the frequency bands, relative to other frequencies of each of the frequency bands" was not described in the original Specification and/or the original claims."

Paragraph 10 teaches setting levels at each of the frequency bands based on detection but does not describe that the modulation level is set relative to other frequencies of each of the frequency bands (i.e., dependent on each of the frequencies in the other frequency bands

Paragraph 41 teaches modulation based on "new formant information" that has been produced based on an envelope detector and interpolator, but again this does not mention that the modulation level is dependent on other frequencies of each frequency bands, at least because the interpolation and envelope detection does not incorporate other frequencies in each of the frequency bands when determining the modulation level.

Paragraph 49 teaches levels for each frequency being determined but not with any relationship to any other frequency in each of the frequency bands. The sinc function in Figure 7c which the paragraph references is what the individual frequencies, but it is not relative to the other frequencies of each of the bands or based on any information provided for the other frequencies in each of the frequency bands. It also states that the level a5' is derived when the center of the sinc function is shown as being in agreement with f5, but this describes only the sinc function which does not encompass each of the frequency bands and also the sinc function is not a frequency in each of the other frequency bands.

Also it is not clear what applicant means by “setting the modulation levels… relative to other frequencies of each of the frequency bands” as described below in the 35 USC 112-2nd paragraph rejection.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1, 37-38, and 52 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As per Claims 1 and 37-38, it is not clear what applicant means by "relative to other frequencies of each of the frequency bands" because setting a modulation level at a particular value (e.g., 1) when there are different modulation values for other parts of the spectrum (e.g., 2, 3, anything that is not 1) invariably sets the value at some level that has a relative difference to other modulation values applied elsewhere. Therefore, if there is some significance to how one modulation value is calculated (i.e., by using the other modulation levels) then this must be more clearly claimed.

It is not clear how the modulation levels are set because “relative to other frequencies” is only descriptive language that does not provide any detail about the relationship between the other frequencies and the set modulation level such that one of ordinary skill in the art can make and use the invention.

Also, if applicant intends that only the center frequencies are modulated, and that "relative to..." means that everything but a given center frequency is left fixed, then there

is a contradiction because that means multiple center frequencies are being changed when the requirements of changing one of the multiple center frequencies requires that all other frequencies be unchanged, including the other center frequencies which applicant claims are changed (i.e. the intended interpretation requires that only one center frequency is changed to be non-contradictory).

Claim 52 recites "the second musical tune signals" which makes it unclear whether applicant intended multiple second musical tone signals to be input by the input means or whether this is a typographical error and that the filtering means was only meant to divide the only second musical tone signal that gives this recitation antecedent basis.

For the purpose of applying art the examiner has interpreted "the second musical tune signals" as –the second musical tone signal--.

Claim Rejections - 35 USC § 101

6. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claim 37 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claim 37 is rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. Supreme Court precedent1[1] and recent Federal Circuit decisions2[2] indicate that a statutory "process" under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. While the instant claim(s) recite a series of steps or acts to be performed, the claim(s) neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process.

The method steps consist of a series of calculations and analyses of signals that do not require a machine. Therefore, the method steps are not tied to a machine as required in In Re Bilski.

Applicant previously argued that signal transformation is actual transformation however current office policy does not accept signal transformations from one signal to another signal of the same type as a physical transformation because they are still made of the same physical substance even if the data they represent is the same. Therefore, the method steps, which are only a series of calculations and determinations that can be made by a human, are non-statutory under In Re Bilski.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi (US 2003/0014246), in view of Cano et al. ("Voice Morphing System for Impersonating in Karaoke Applications"), hereafter Cano, and Gibson et al. (US 6,336,092).

As per Claim 1, Choi teaches a vocoder system comprising: formant detection means for analyzing a first tone signal to detect formant characteristics of the first tone signal ("voice signal of the subscriber… detect the spectrum parameter", paragraph 46; "spectrum parameter… are detected", paragraph 47; where the spectrum of a signal comprises, among other things, the formants of a voice)

tone signal input means for inputting a second tone signal that corresponds to specified pitch information ("selects the kind of the effect... converts the spectrum parameter… with reference to the loaded spectrum parameter…conversion of the spectrum parameter... height of voice", paragraph 47)

setting means for setting modulation levels, relative to other frequencies based on the formant characteristics and formant control information with which the formant characteristics detected by the formant detection means are changed ("selects the kind

of the effect... converts the spectrum parameter… with reference to the loaded spectrum parameter…conversion of the spectrum parameter... height of voice", paragraph 47; "modulating", paragraph 38; see Response to Arguments, where interpolating one part of the spectrum where the input and target are relatively similar necessarily has a different modulation set relative [i.e. compared to] other modulated frequency values/levels in other frequencies where the difference between the input and target are different.)

modulation means for modulating a level of a signal based on the modulation level set in the setting means ("modulating", paragraph 38).

Choi fails to teach the tone signals are musical tone signals.

Cano teaches the tone signals are musical tone signals ("target singer", Introduction).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi to include the teaching of Cano of the tone signals are musical tone signals, in order to extend voice changing to singing applications, as described by Cano (Introduction).

Choi, in view of Cano, fail to teach division means for dividing the second musical tone signal into a plurality of frequency bands, the respective center frequencies of which have been fixed, where the modulation levels are set at the fixed center frequency of each of the frequency bands, and where modulating the level of a signal modulates levels of each of the frequency bands, and where the frequencies are of each of the frequency bands.

Gibson suggests division means for dividing the second musical tone signal into a plurality of frequency bands, the respective center frequencies of which have been fixed, where the modulation levels are set at the fixed center frequency of each of the frequency bands, and where modulating the level of a signal modulates levels of each of the frequency bands, and where the frequencies are of each of the frequency bands ("signal is split into two equal-width frequency bands… gain compensation… transformed ", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; where, to determine the target voice characteristics and the necessary transformations, an analysis of the target voice signals in the corresponding frequency bands is obvious/necessary).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi, in view of Cano, to include the teaching of Gibson of division means for dividing the second musical tone signal into a plurality of frequency bands, the respective center frequencies of which have been fixed, where the modulation levels are set at the fixed center frequency of each of the frequency bands, and where modulating the level of a signal modulates levels of each of the frequency bands and where the frequencies are of each of the frequency bands, in order to transform voices with reduced computational demands, as described by Gibson (col. 9, lines 62-65).

As per Claims 37-38, their limitations are similar to those in Claim 1, and so are rejected under similar rationale.

As per Claim 2, Choi fails to teach wherein the format detection means comprises a filter.

Gibson suggests wherein the format detection means comprises a filter ("signal is split into two equal-width frequency bands… gain compensation… transformed ", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; where division into frequency bands involves filtering an input spectrum).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi, in view of Cano, to include the teaching of Gibson of wherein the format detection means comprises a filter, in order to transform voices with reduced computational demands, as described by Gibson (col. 9, lines 62-65).

As per Claim 3, Choi teaches wherein the formant detection comprises a Fourier transform ("spectrum parameter… are detected", paragraph 47; where a spectrum is a frequency domain representation obtained by applying a transform, which is commonly a Fourier transform).

As per Claims 4-6, Choi, in view of Cano, fail to teach wherein the division means comprises a filter.

Gibson suggests wherein the division means comprises a filter ("signal is split into two equal-width frequency bands… gain compensation… transformed ", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; where division into frequency bands involves filtering an input spectrum).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi, in view of Cano, to include the teaching of Gibson of wherein the division means comprises a filter, in order to transform voices with reduced computational demands, as described by Gibson (col. 9, lines 62-65).

As per Claim 49, Choi, in view of Cano, fail to teach wherein the filter comprises a digital filter having frequency characteristics defined by a plurality of filter coefficients and wherein the setting means sets the modulation levels, free of changing the filter coefficients.

Gibson teaches the filter comprises a digital filter having frequency characteristics defined by a plurality of filter coefficients and wherein the setting means sets the modulation levels, free of changing the filter coefficients (Figures 7-8, low pass and high pass filters; "method … modify the original spectral envelope", col. 7, line 18 – col. 8, line 28; see Response to arguments, where all filters including the low and high

pass filters at least obviously are defined by their filter coefficients [based on mathematical theory], and also the filters being modified by the methods are applied in the "modify... spectral envelope" blocks which are subsequent processes independent of the high and low pass filters themselves, and so the high and low pass filter coefficients are not changed).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi, in view of Cano, to include the teaching of Gibson of the filter comprises a digital filter having frequency characteristics defined by a plurality of filter coefficients and wherein the setting means sets the modulation levels, free of changing the filter coefficients, in order to transform voices with reduced computational demands, as described by Gibson (col. 9, lines 62-65).

As per Claim 50, Choi, in view of Cano, fail to teach wherein the filter comprise a digital filter having frequency characteristics defined by a plurality of filter coefficients, and wherein the setting means sets the modulation levels while the filter coefficients remain constant.

Gibson teaches wherein the filter comprise a digital filter having frequency characteristics defined by a plurality of filter coefficients, and wherein the setting means sets the modulation levels while the filter coefficients remain constant (Figures 7-8, low pass and high pass filters; “method … modify the original spectral envelope”, col. 7, line 18 – col. 8, line 28; see Response to arguments, where all filters including the low and high pass filters at least obviously are defined by their filter coefficients [based on

mathematical theory], and also the filters being modified by the methods are applied in the "modify... spectral envelope" blocks which are subsequent processes independent of the high and low pass filters themselves, and so the high and low pass filter coefficients are not changed).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi, in view of Cano, to include the teaching of Gibson of wherein the filter comprise a digital filter having frequency characteristics defined by a plurality of filter coefficients, and wherein the setting means sets the modulation levels while the filter coefficients remain constant, in order to transform voices with reduced computational demands, as described by Gibson (col. 9, lines 62-65).

As per Claims 7-9, Choi, in view of Cano, fail to teach wherein the division means comprises a Fourier transform.

Gibson suggests wherein the division means comprises a Fourier transform ("signal is split into two equal-width frequency bands… gain compensation… transformed", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; "spectral", col. 9, lines 32-43; where division into frequency bands involves filtering an input spectrum).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi, in view of Cano, to include the teaching of Gibson of

wherein the division means comprises a Fourier transform, in order to transform voices with reduced computational demands, as described by Gibson (col. 9, lines 62-65).

As per Claims 10-18, Choi fails to teach wherein the setting means sets the modulation levels by interpolation processing based on the formant characteristics and the formant control information.

Cano teaches wherein the setting means sets the modulation levels by interpolation processing based on the formant characteristics and the formant control information ("target singer", Introduction; “interpolated”, Section 2).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi to include the teaching of Cano of wherein the setting means sets the modulation levels by interpolation processing based on the formant characteristics and the formant control information, in order to extend voice changing to singing applications, as described by Cano (Introduction).

As per Claim 19-23, Choi teaches wherein the setting means sets modulation levels based on pitch information, the formant characteristics, and the formant control information (“pitch… pitch period”, paragraph 35; “converting… the pitch period”, paragraph 17).

As per Claims 24-27, Choi teaches wherein the setting means sets modulation levels based on musical interval, the formant characteristics, and the formant control

information (“pitch… pitch period”, paragraph 35; “converting… the pitch period”, paragraph 17; where a “period” is an interval, and the pitch applies to musical characteristics).

As per Claim 28-36, Choi teaches wherein the setting means stores a formant change table that changes the formant non-uniformly and sets the modulation levels based on the change table ("selected effect", paragraph 19; "cave", paragraph 47; where the information for each of the effects must be arranged in memory to be found by the application, and this organized memory is a form of table).

Choi, in view of Cano, fail to teach where the modulation levels correspond to each of the frequency bands.

Gibson suggests where the modulation levels correspond to each of the frequency bands (“signal is split into two equal-width frequency bands… gain compensation… transformed”, col. 9, lines 44-65; “summing a gain-compensated high-frequency signal and the transformed low-frequency component”, col. 9, line 65 – col. 10, line 2; “source and target voice signals”, col. 7, lines 17-28; “spectral”, col. 9, lines 32-43; where division into frequency bands involves filtering an input spectrum).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi, in view of Cano, to include the teaching of Gibson of where the modulation levels correspond to each of the frequency bands, in order to transform voices with reduced computational demands, as described by Gibson (col. 9, lines 62-65).

As per Claim 39, its limitations are similar to those in Claim 2, and so is rejected under similar rationale.

As per Claim 40, its limitations are similar to those in Claim 3, and so is rejected under similar rationale.

As per Claim 41, Choi teaches wherein the first musical tone signal is produced by a male voice or a female voice ("voice", paragraph 4; where voices by a human are either male or female).

As per Claim 42, Choi, in view of Cano, fail to teach wherein the level of the signal of each of the frequency bands modulated by the modulation means is an amplitude of the signal.

Gibson suggests division wherein the level of the signal of each of the frequency bands modulated by the modulation means is an amplitude of the signal ("signal is split into two equal-width frequency bands… gain compensation… transformed ", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; gains affect amplitudes of a spectrum).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi, in view of Cano, to include the teaching of Gibson of wherein the level of the signal of each of the frequency bands modulated by the modulation means is an amplitude of the signal, in order to transform voices with reduced computational demands, as described by Gibson (col. 9, lines 62-65).

As per Claim 43, Choi, in view of Cano, fail to teach wherein, in the modulation means, the center frequencies of the frequency bands are maintained as fixed in the division means.

Gibson suggests wherein, in the modulation means, the center frequencies of the frequency bands are maintained as fixed in the division means ("signal is split into two equal-width frequency bands… gain compensation… transformed ", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; the filters do not change the frequency range that they occupy, and so their center frequencies do not change either).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi, in view of Cano, to include the teaching of Gibson of wherein, in the modulation means, the center frequencies of the frequency bands are maintained as fixed in the division means, in order to transform voices with reduced computational demands, as described by Gibson (col. 9, lines 62-65).

As per Claims 44, Choi fails to teach wherein the setting means sets the modulation levels by using a polynomial interpolation.

Cano teaches wherein the setting means sets the modulation levels by using a polynomial interpolation ("target singer", Introduction; “interpolated”, Section 2; where the use of polynomial interpolations are an obvious to one of ordinary skill in the art as a type of interpolation that can be used to convert voices).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi to include the teaching of Cano of wherein the setting means sets the modulation levels by using a polynomial interpolation, in order to extend voice changing to singing applications, as described by Cano (Introduction).

As per Claim 45, Choi, in view of Cano, fail to teach wherein the center frequencies of the modulated signals of the frequency bands are equal to the respective center frequencies of the frequency bands, as fixed by the division means.

Gibson suggests wherein the center frequencies of the modulated signals of the frequency bands are equal to the respective center frequencies of the frequency bands, as fixed by the division means (“signal is split into two equal-width frequency bands… gain compensation… transformed ”, col. 9, lines 44-65; “summing a gain-compensated high-frequency signal and the transformed low-frequency component”, col. 9, line 65 – col. 10, line 2; “source and target voice signals”, col. 7, lines 17-28; the filters do not change the frequency range that they occupy, and so their center frequencies do not change either).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi, in view of Cano, to include the teaching of Gibson of wherein the center frequencies of the modulated signals of the frequency bands are equal to the respective center frequencies of the frequency bands, as fixed by the division means, in order to transform voices with reduced computational demands, as described by Gibson (col. 9, lines 62-65).

As per Claim 46, Choi teaches wherein the first musical tone signal is a speech signal (“voice”, paragraph 4).

As per Claim 47, Choi fails to teach wherein the setting means sets the modulation level by interpolation processing based on the formant characteristics at a plurality of frequencies.

Cano teaches wherein the setting means sets the modulation level by interpolation processing based on the formant characteristics at a plurality of frequencies ("target singer", Introduction; “interpolated”, Section 2; where the use of polynomial interpolations are an obvious to one of ordinary skill in the art as a type of interpolation that can be used to convert voices).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi to include the teaching of Cano of wherein the setting means sets the modulation level by interpolation processing based on the formant

characteristics at a plurality of frequencies, in order to extend voice changing to singing applications, as described by Cano (Introduction).

Choi, in view of Cano, fail to teach the modulation level is set at the fixed center frequency of at least one of the frequency bands.

Gibson suggests the modulation level is set at the fixed center frequency of at least one of the frequency bands ("signal is split into two equal-width frequency bands… gain compensation… transformed ", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; the filters do not change the frequency range that they occupy, and so their center frequencies do not change either).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi, in view of Cano, to include the teaching of Gibson of the modulation level is set at the fixed center frequency of at least one of the frequency bands, in order to transform voices with reduced computational demands, as described by Gibson (col. 9, lines 62-65).

As per Claims 48, Choi fails to teach wherein the setting means sets the modulation levels by using a polynomial interpolation of the formant characteristics at a plurality of frequencies.

Cano teaches wherein the setting means sets the modulation levels by using a polynomial interpolation of the formant characteristics at a plurality of frequencies

("target singer", Introduction; “interpolated”, Section 2; where the use of polynomial interpolations are an obvious to one of ordinary skill in the art as a type of interpolation that can be used to convert voices).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi to include the teaching of Cano of wherein the setting means sets the modulation levels by using a polynomial interpolation, in order to extend voice changing to singing applications, as described by Cano (Introduction).

Choi, in view of Cano, fail to teach wherein the modulation levels are set at the fixed center frequency of at least one of the frequency bands.

Gibson suggests wherein the modulation levels are set at the fixed center frequency of at least one of the frequency bands (“signal is split into two equal-width frequency bands… gain compensation… transformed ”, col. 9, lines 44-65; “summing a gain-compensated high-frequency signal and the transformed low-frequency component”, col. 9, line 65 – col. 10, line 2; “source and target voice signals”, col. 7, lines 17-28; the filters do not change the frequency range that they occupy, and so their center frequencies do not change either).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi, in view of Cano, to include the teaching of Gibson of wherein the modulation levels are set at the fixed center frequency of at least one of the frequency bands, in order to transform voices with reduced computational demands, as described by Gibson (col. 9, lines 62-65).

3. Claim 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over Choi (US 2003/0014246), in view of Cano et al. ("Voice Morphing System for Impersonating in Karaoke Applications"), hereafter Cano, Gibson et al. (US 6,336,092), and Flanagan (US 4,374,304).

As per Claim 52, Choi teaches a vocoder system comprising: formant detection means for analyzing a first tone signal to detect formant characteristics of the first tone signal ("voice signal of the subscriber… detect the spectrum parameter", paragraph 46; "spectrum parameter… are detected", paragraph 47; where the spectrum of a signal comprises, among other things, the formants of a voice)

tone signal input means for inputting a second tone signal that corresponds to specified pitch information ("selects the kind of the effect... converts the spectrum parameter… with reference to the loaded spectrum parameter…conversion of the spectrum parameter... height of voice", paragraph 47)

setting means for setting modulation levels based on the formant characteristics and formant control information with which the formant characteristics detected by the formant detection means are changed ("selects the kind of the effect... converts the spectrum parameter… with reference to the loaded spectrum parameter…conversion of the spectrum parameter... height of voice", paragraph 47; "modulating", paragraph 38)

modulation means for modulating a level of a signal based on the modulation level set in the setting means ("modulating", paragraph 38).

Choi fails to teach the tone signals are musical tone signals.

Cano teaches the tone signals are musical tone signals ("target singer", Introduction).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi to include the teaching of Cano of the tone signals are musical tone signals, in order to extend voice changing to singing applications, as described by Cano (Introduction).

Choi, in view of Cano, fail to teach filtering means for dividing the second musical tone signal into a plurality of frequency bands where the modulation levels are set at the fixed center frequency of each of the frequency bands, and where modulating the level of a signal modulates levels of each of the frequency bands.

Gibson suggests division means for dividing the second musical tone signal into a plurality of frequency bands, the respective center frequencies of which have been fixed, where the modulation levels are set at the fixed center frequency of each of the frequency bands, and where modulating the level of a signal modulates levels of each of the frequency bands ("signal is split into two equal-width frequency bands… gain compensation… transformed ", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; where, to determine the target voice characteristics and the necessary transformations, an analysis of the target voice signals in the corresponding frequency bands is obvious/necessary).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi, in view of Cano, to include the teaching of Gibson of

division means for dividing the second musical tone signal into a plurality of frequency bands, the respective center frequencies of which have been fixed, where the modulation levels are set at the fixed center frequency of each of the frequency bands, and where modulating the level of a signal modulates levels of each of the frequency bands, in order to transform voices with reduced computational demands, as described by Gibson (col. 9, lines 62-65).

Choi, in view of Cano and Gibson, fail to teach where the division is based on respective fixed center frequencies.

Flanagan teaches where the division is based on respective fixed center frequencies ("partition the received signal into subbands having center frequencies", col. 8, lines 44-62; where Flanagan teaches that the division of a signal into subbands can be based on what the center frequencies are).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to perform a simple substitution of Gibson's subband division with Flanagan's subband division based on specific center frequencies, because Gibson teaches subband division that differs from the claimed invention based on an element taught in Flanagan (i.e. where the division is based on center frequencies), and one of ordinary skill in the art could have substituted Gibson's band division with Flanagan's center-frequency based division/partitioning to obtain the predictable results of a system that produces a signal divided into different subbands and analyzed on a sub-band basis.

Allowable Subject Matter

4. Claim 51 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ERIC YEN whose telephone number is (571)272-4249. The examiner can normally be reached on M-F 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on 571-272-7602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

EY 2/11/10
/Eric Yen/
Examiner, Art Unit 2626